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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Balloni et al.

Title: METHOD AND APPARATUS FOR REMOTE OR COLLABORATIVE CONTROL OF AN IMAGING SYSTEM

Appl. No.: 09/745,320

Filing Date: 12/21/2000

Examiner: Dohm Chankong

Art Unit: 2152

Conf. No.: 2052

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EV 828707665 US (Express Mail Label Number) 9/21/06 (Date of Deposit)

Carolyn Simpson (Printed Name)

Carolyn Simpson (Signature)

TRANSMITTAL

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Transmitted herewith is the following document for the above-identified patent application:

[**X**] Reply Brief on Appeal (65 pages).

Respectfully submitted,

Date Sept. 21, 2006

By

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

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Carolyn Simpson — (Printed Name)
Carolyn Simpson — (Signature)

REPLY BRIEF ON APPEAL

Mail Stop Appeal Brief - Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In Response to the Examiner's Notification of Non-Compliant Appeal Brief mailed August 21, 2006, under the provisions of 37 C.F.R. § 41.37, this corrected Reply Brief is being filed together with authorization under 37 C.F.R. 41.20(b)(2) to charge any deficiencies to the undersigned deposit account 07-0845.

REAL PARTY IN INTEREST

This patent is assigned to GE Medical Systems Global Technology Company and involves GE Medical Systems.

RELATED APPEALS AND INTERFERENCES

None.

STATUS OF CLAIMS

Claims 1-76 are pending in this application. Each claim has been rejected and each is being appealed.

STATUS OF AMENDMENTS

No amendments have been made after the most recent final rejection.

SUMMARY OF CLAIMED SUBJECT MATTER

The present application relates generally to an imaging systems environment configured to permit remote and/or collaborative control of imaging systems. The claimed subject matter generally relates to methods and apparatus that permit one or more operators to simultaneously and/or collaboratively control acquisition of images acquired from an imaging system.

As requested a summary mapping the independent claims 1, 17, 31, 46 and 66 separately to the Specification by page and line number and to the drawings is provided. Each element and limitation are disclosed (at least) in the indicated location. Such disclosure includes alternate embodiments which may separately form a basis of support for the listed embodiment. However, the embodiments listed may not be the only embodiments covered by the listed embodiment. Further some claim elements include additional background discussion which helps the exemplary embodiment that provides support for the claim element, but which does not necessarily form part of the claim element.

Claims	Location
1. A method for remote or collaborative control of an imaging system, the imaging system associated with an application model located at a first location and the application model being in communication with the imaging system, the method comprising:	"Referring to FIG. 1, there is shown the major components of an imaging systems environment 10. Environment 10 includes imaging systems 12, a communications network 14, and workstations 16. Each of imaging systems 12 and workstations 16 is coupled to communications network 14. Imaging systems 12 include, but are not limited to, magnetic resonance (MR) imaging systems, computerized tomography (CT) imaging systems, nuclear medicine (NM) imaging systems, x-ray systems, and a variety of other imaging systems. It is contemplated that imaging systems 12 are not limited to medical imaging systems and may also include scanners or imaging systems for non-medical uses, such as, for security, geological surveys, etc. Communications network 14 is preferably an ethernet, fiber optic, or other applicable communication connection related to LAN, WAN, or wireless networking and is configured to utilize protocols such as TCP/IP, CORBA, or Java RMI. Each of workstations 16 can be located proximate or distal to any of imaging systems 12 as long as both are able to communicate with each other via, such as, communications network 14. Workstations 16 can include, but are not limited to, a central site service station, an off-line review station, a central site applications station, a remote reading station, an education/training station, and a remote operator control station." Page 4, lines 1 – 19 "A representative imaging system 40 is also shown in FIG. 2. Imaging system 40 is preferably an MR imaging system. However, it should be understood that exemplary embodiments may alternatively include other types of imaging systems, such as CT imaging systems and other medical imaging systems. Thus, imaging system 40 shown as an MR imaging system is for illustration purposes only and in no way limits the implementation of the exemplary embodiments using other types of imaging systems. Imaging system 40 includes a magnet assembly 42, an MR

	system control 44, gradient coil drivers 46, a radio frequency (RF) transceiver circuit 48, a magnet side operator console 50, a main operator console 52, and a collaboration control 54." Page 5, lines 3 – 13; *See e.g.*, Page 11, line 8 thru Page 12, line 25
providing a first user interface at the first location;	"Operator console 50 includes a display 56 coupled to a control panel 58, and an input device 60 coupled to control panel 58. Operator console 52 includes a display 62 coupled to a control panel 64, and an input device 66 coupled to control panel 64. Each of displays 56, 62 can include, but is not limited to, a CRT display, an LCD, an LED display, a plasma display, a touch screen, a projection display, a printer, a plotter, etc. Each of input devices 60, 66 is selected from a group including, but not limited to, a mouse, a joystick, a trackball, a touch screen, a light wand, a voice control device, and a custom keyboard/keypad. Each of control panels 58, 64 includes dedicated buttons, knobs, switches, slider indicators, LED indicators, etc., to provide additional interactive functionality. Operator consoles 50, 52 (also referred to as operator interfaces) are configured to enable the operator to control the production and visualization of images. Conventionally, operator console 50 is located proximate to magnet assembly 42. Operator console 50 is also referred to as a table side or scanner side operator console. Operator console 52 is also proximate magnet assembly 42 and is located outside of the scan room. As such, the operator avoids introducing objects into the scan room during image acquisition (e.g., metallic objects which may damage magnet assembly 42). The operator, who may operate imaging system 40 for long periods of time, also avoids exposure to radiation (whether ionizing (CT) or non-ionizing (MR)) repeatedly emitted from imaging system 40." Page 6, lines 8 – 27
providing a second user interface at a second location, in response to a request for remote or collaborative control of the imaging system at the second location; and	"When both magnet side operator console 50 and main operator console 52 are accessed, collaboration control 54 is configured to provide application user interface 70 to main operator console 52 and an alternate application user

	interface 74 to magnet side operator console 50. Application model 72 generates alternate application user interface 74 in response to the second local operator console being initially accessed while the first local operator console is already in use. Alternatively, application user interface 70 may remain with the first local operator console accessed (e.g., magnet side operator console 50) and the alternate interface 74 may be provided to the second operator console accessed (e.g., main operator console 52). Each of alternate application user interfaces 24, 34, 74 is similar to application user interface 70 and includes substantially the same functionality thereto. Each of alternate interfaces 24, 34, 74 is preferably an identical copy of all or a portion of application user interface 70, such that more than one person may simultaneously drive application model 72. In another embodiment, each of alternate interfaces 24, 34, 74 may be a different interface from application user interface 70 but which is still configured to drive application model 72. Similar to application user interface 70, alternate interface 74 also communicates with application model 72 to transmit commands from an operator to MR system control 44 and to receive operator interface updates in response to the executed commands. When a person desires to interact with or access information associated with imaging system 40 from at least one remote operator console (i.e., any operator console or workstation that communicates with application model 72 via network 14, such as workstations 16 or workstations 20, 30), a local user interface included in that remote operator console communicates with application model 72 via network 14. In response, application model 72 generates an alternate application user interface to be provided to that remote operator console. Accordingly, the person at this remote operator console can transmit commands to application model 72 via the alternate interface and network 14, and receive user interface updates from

application model 72 via network 14 and the alternate interface.

For example, a person on workstation 20 initiates a connection through a local user interface (not shown) included in computer 22. The connection request is transmitted to application model 72 via network 14. Application model 72 generates an alternate application user interface 24 (alternate interface 24 having similar characteristics to alternate interface 74) to be provided to computer 22. Then the person can drive application model 72 via alternate interface 24 and network 14, thereby specifying commands to application model 72 and receiving user interface updates from application model 72 in response to these commands.

A local user interface is preferably included in each remote operator console to initiate connection to imaging system 40 or collaboration control 54, or to permit local access of features and/or data located at a given remote operator console (e.g., reviewing images already stored in a given remote operator console). Workstation 30 and its alternate application user interface 34 are similar to workstation 20 and alternate interface 24, respectively, discussed above. However, it should be understood that each of alternate interface 24, alternate interface 34, or alternate interface 74 would only be generated as needed (i.e., when a person at the corresponding operator console or workstation requests a connection to an imaging system or otherwise wishes to communicate with another operator console or workstation). For example, if main operator console 52 and workstation 20 are accessed, then alternate interface 24 would be generated (such that application user interface 70 and/or alternate interface 24 can drive application model 72) but alternate interfaces 74 and 34 would not exist.

In this manner, a given imaging system can be simultaneously accessed by one or more persons located at local and/or remote locations. All the persons accessing a given imaging system at a

given time may be shown similar, if not identical, information in real-time or quasi real-time via corresponding user interfaces, and each may also have the ability to effect the displayed information for him/herself as well as others. Preferably, commands from each of the active user interfaces are processed by the application model, and the application model transmits corresponding user interface updates to all of the active user interfaces. Real-time or quasi real-time refers to continuous monitoring, execution, and updating of operator commands and results as rapidly as possible, as constrained by system performance. Several examples illustrating uses of the remote and/or collaborative control scheme are provided below.

For example, a scanner operator at main operator console 52 and a physician at a reading room (typically remotely located with respect to imaging system 40, such as workstation 20) wish to confer about the orientation and location of the next imaging or scan slice(s) of a patient presently positioned within magnet assembly 42. Using application user interface 70 and alternate interface 24, the scanner operator and the physician, respectively, can "share" a graphical prescription tool to interactively collaborate on the orientation and location of the next imaging slice(s) in real-time. The information displayed on displays 62 and 26 would be the same, such that each would see prescriptions made by the other; and control panel 64, input device 66, or input device 28 would be utilized by the scanner operator or physician, respectively.

In another example, the scanner operator at main operator console 52 may set up a real-time scan (e.g., specify initial parameters and properly position the patient) of the patient positioned within magnet assembly 42. Then the scanner operator can request the physician in a remote reading room (e.g., workstation 20) to operate (e.g., initiate and henceforth control) imaging system 40. This permits the physician to control the rest of the scan session (e.g., resolution of images, length of scan time, scan slice orientation, etc.) without

being physically present at either operator console 50 or 52. This and the previous example are also applicable when one or more mobile scanners collaborating with a central facility of physicians or diagnosticians are used in the event of a natural disaster, in a battlefield, a sporting event, etc.

In still another example, training, servicing, troubleshooting, performance evaluation, and/or design evaluation may be carried out with the remote and/or collaborative control scheme. A person (e.g., a central site service engineer) at a central site service workstation can remotely monitor the actions of a scanner operator at the local operator console or at any of workstation 16. Based on this monitoring, the person may provide the scanner operator with instructions via telephone and/or an alternate application user interface regarding correct operation of that imaging system. Similarly, training of the scanner operator(s) may be provided via remote monitoring and collaboration. Moreover, the scanner operators may be evaluated on their performance of specific tasks by a manager or a system designer (e.g., length of time to set up a scan; number of prescription modifications, etc.) to provide job performance data or next generation design data, respectively. Alternatively, when the scanner operator is at the local operator console (so is proximate to a magnet assembly), the engineer may troubleshoot problems associated with that imaging system. The engineer may remotely monitor the imaging system's outputs (relative to the scanner operator and/or engineer's inputs) and request the scanner operator to perform equipment changes or configurations (e.g., placing various test objects within the magnet assembly) to determine the problem and possibly even the solution.

In still yet another example, any of the imaging systems 12 or workstations 16 may be accessed for off-line review of its performance and activities by an off-line review workstation. Such off-line review is preferably performed after the remote and/or collaborative session with a given imaging system has been completed. The off-line

	review facilitates, among others, maintenance based on actual usage and simultaneous software upgrades." Page 9, line 3 – Page 12, line 25
controlling the application model using the first user interface and the second user interface at about a same time.	"Collaboration control 54 is configured to permit one or more operators, local or remote, to interface with imaging system 40. Collaboration control 54 is further configured to permit real-time collaborative control from more than one operator console or workstation. Collaboration control 54 is still further configured to display the interfacing actions and images in real-time in all of the involved operator consoles and/or workstations. Thus, collaboration control 54 may provide a real-time user interface to each operator console or workstation connected to network 14 and which is desirous of controlling, viewing images, and/or otherwise being involved with activities relating to imaging system 40. In one embodiment, collaboration control 54 includes an application 68 comprised of at least an application user interface 70 and an application model 72. Application user interface 70 and application model 72 are preferably software. Alternatively, application user interface 70 and/or application model 72 may be firmware, hardware, software, and/or combinations thereof (such as an application specific integrated circuit (ASIC)). Collaboration control 54 preferably includes a processor and a memory with corresponding software. Collaboration control 54 is in communication with MR system control 44 via application model 72 and an application server (not shown) included in MR system control 44. However, it is contemplated that the functionality of MR system control 44 and collaboration control 54 may be embodied in a single component. It is also contemplated that some of the functionality of MR system control 44 or collaboration control 54 may be performed in control 54 or control 44, respectively. Thus, MR system control 44 and collaboration control 54, alone or in combination, perform, among others, data acquisition, waveform or pulse sequence configuration, reconstruction, image presentation, human interface processing,

and coordination of such interfacing activities when more than one operator console or workstation are being accessed by users.

Each operator at an operator console or workstation interacts with a given imaging system via an application user interface, application model 72, and network 14. The application user interface may be application user interface 70 (also referred to as the primary application user interface) in collaboration control 54 or an alternate application user interface (also referred to as the non-primary or secondary application user interface) (to be described in detail hereinafter). Preferably, application user interface 70 and application model 72 are in communication with each other and are open or accessible at all times for the lifetime of the application when environment 10 is operational.

When a local operator console (i.e., magnet side operator console 50 or main operator console 52) is accessed by an operator or user (e.g., a technologist, a physician, a service/maintenance provider, etc.), communication with imaging system 40 is provided via application 68 on collaboration control 54. Collaboration control 54 provides application user interface 70 to that local operator console. For example, application user interface 70 includes a graphical user interface (GUI) or other control or viewing mechanisms for the operator to interact with system 40. Through interface 70, the operator can specify an imaging or scan plane, specify the desired image contrast, initiate a scan, request display of stored images, etc.

Commands made to interface 70 are communicated to application model 72. Application model 72 processes these commands and, in turn, communicates with MR system control 44 to complete the requested commands. Completed actions and data from imaging system 40 are transmitted to application model 72 via MR system control 44. Application model 72 may process such information to configure it into an appropriate update to application user interface 70. Application model 72 then transmits a user interface update to interface 70. In this manner,

	the operator at the local operator console will see the results of his/her request on display 56 and/or control panel 58. Application model 72 translates user interface commands into actions and calculations, and also receives results of a given scan or scanning session for presentation. As such, application model 72 is involved in, but not limited to, scanner set up (e.g., image contrast, pulse sequence timing, hardware settings, etc.); scanner control; real-time scanner control (e.g., real-time change(s) and/or prescription of image contrast, pulse sequence timing, hardware settings, etc.); timely presentation of one or more images; archiving; networking; and image presentation control for non-electronic formats, such as in film." Page 6, line 28 – Page 9, line 2 *See e.g.*, Page 10, line 25 – Page 13, line 22
17. An apparatus for remote or collaborative control of an imaging system, the imaging system, the apparatus comprising:	"Referring to FIG. 1, there is shown the major components of an imaging systems environment 10. Environment 10 includes imaging systems 12, a communications network 14, and workstations 16. Each of imaging systems 12 and workstations 16 is coupled to communications network 14. Imaging systems 12 include, but are not limited to, magnetic resonance (MR) imaging systems, computerized tomography (CT) imaging systems, nuclear medicine (NM) imaging systems, x-ray systems, and a variety of other imaging systems. It is contemplated that imaging systems 12 are not limited to medical imaging systems and may also include scanners or imaging systems for non-medical uses, such as, for security, geological surveys, etc. Communications network 14 is preferably an ethernet, fiber optic, or other applicable communication connection related to LAN, WAN, or wireless networking and is configured to utilize protocols such as TCP/IP, CORBA, or Java RMI. Each of workstations 16 can be located proximate or distal to any of imaging systems 12 as long as both are able to communicate with each other via, such as, communications network 14. Workstations 16 can include, but are not limited to,

	a central site service station, an off-line review station, a central site applications station, a remote reading station, an education/training station, and a remote operator control station." Page 4, lines 1 – 19 "A representative imaging system 40 is also shown in FIG. 2. Imaging system 40 is preferably an MR imaging system. However, it should be understood that exemplary embodiments may alternatively include other types of imaging systems, such as CT imaging systems and other medical imaging systems. Thus, imaging system 40 shown as an MR imaging system is for illustration purposes only and in no way limits the implementation of the exemplary embodiments using other types of imaging systems. Imaging system 40 includes a magnet assembly 42, an MR system control 44, gradient coil drivers 46, a radio frequency (RF) transceiver circuit 48, a magnet side operator console 50, a main operator console 52, and a collaboration control 54." Page 5, lines 3 – 13; *See e.g.*, Page 11, line 8 thru Page 12, line 25
a control unit including a first user interface and an application model, the control unit being in communication with the imagine system;	"Collaboration control 54 is configured to permit one or more operators, local or remote, to interface with imaging system 40. Collaboration control 54 is further configured to permit real-time collaborative control from more than one operator console or workstation. Collaboration control 54 is still further configured to display the interfacing actions and images in real-time in all of the involved operator consoles and/or workstations. Thus, collaboration control 54 may provide a real-time user interface to each operator console or workstation connected to network 14 and which is desirous of controlling, viewing images, and/or otherwise being involved with activities relating to imaging system 40. In one embodiment, collaboration control 54 includes an application 68 comprised of at least an application user interface 70 and an application model 72. Application user interface 70 and application model 72 are preferably software. Alternatively, application user interface 70 and/or application model 72 may be firmware, hardware, software, and/or combinations thereof (such as an application specific integrated circuit (ASIC)).

Collaboration control 54 preferably includes a processor and a memory with corresponding software.

Collaboration control 54 is in communication with MR system control 44 via application model 72 and an application server (not shown) included in MR system control 44. However, it is contemplated that the functionality of MR system control 44 and collaboration control 54 may be embodied in a single component. It is also contemplated that some of the functionality of MR system control 44 or collaboration control 54 may be performed in control 54 or control 44, respectively. Thus, MR system control 44 and collaboration control 54, alone or in combination, perform, among others, data acquisition, waveform or pulse sequence configuration, reconstruction, image presentation, human interface processing, and coordination of such interfacing activities when more than one operator console or workstation are being accessed by users.

Each operator at an operator console or workstation interacts with a given imaging system via an application user interface, application model 72, and network 14. The application user interface may be application user interface 70 (also referred to as the primary application user interface) in collaboration control 54 or an alternate application user interface (also referred to as the non-primary or secondary application user interface) (to be described in detail hereinafter). Preferably, application user interface 70 and application model 72 are in communication with each other and are open or accessible at all times for the lifetime of the application when environment 10 is operational.

When a local operator console (i.e., magnet side operator console 50 or main operator console 52) is accessed by an operator or user (e.g., a technologist, a physician, a service/maintenance provider, etc.), communication with imaging system 40 is provided via application 68 on collaboration control 54. Collaboration control 54 provides application user interface 70 to that local operator console. For example, application user interface 70 includes a graphical user interface

	(GUI) or other control or viewing mechanisms for the operator to interact with system 40. Through interface 70, the operator can specify an imaging or scan plane, specify the desired image contrast, initiate a scan, request display of stored images, etc. Commands made to interface 70 are communicated to application model 72. Application model 72 processes these commands and, in turn, communicates with MR system control 44 to complete the requested commands. Completed actions and data from imaging system 40 are transmitted to application model 72 via MR system control 44. Application model 72 may process such information to configure it into an appropriate update to application user interface 70. Application model 72 then transmits a user interface update to interface 70. In this manner, the operator at the local operator console will see the results of his/her request on display 56 and/or control panel 58. Application model 72 translates user interface commands into actions and calculations, and also receives results of a given scan or scanning session for presentation. As such, application model 72 is involved in, but not limited to, scanner set up (e.g., image contrast, pulse sequence timing, hardware settings, etc.); scanner control; real-time scanner control (e.g., real-time change(s) and/or prescription of image contrast, pulse sequence timing, hardware settings, etc.); timely presentation of one or more images; archiving; networking; and image presentation control for non-electronic formats, such as in film." Page 6, line 28 – Page 9, line 2
a second user interface provided at a second location, the second user interface usable for remote or collaborative control of the imaging system and being configured to transmit a command to the control unit and to receive a second user interface update from the control unit;	"When both magnet side operator console 50 and main operator console 52 are accessed, collaboration control 54 is configured to provide application user interface 70 to main operator console 52 and an alternate application user interface 74 to magnet side operator console 50. Application model 72 generates alternate application user interface 74 in response to the second local operator console being initially accessed while the first local operator console is already in use. Alternatively, application user

	interface 70 may remain with the first local operator console accessed (e.g., magnet side operator console 50) and the alternate interface 74 may be provided to the second operator console accessed (e.g., main operator console 52). Each of alternate application user interfaces 24, 34, 74 is similar to application user interface 70 and includes substantially the same functionality thereto. Each of alternate interfaces 24, 34, 74 is preferably an identical copy of all or a portion of application user interface 70, such that more than one person may simultaneously drive application model 72. In another embodiment, each of alternate interfaces 24, 34, 74 may be a different interface from application user interface 70 but which is still configured to drive application model 72. Similar to application user interface 70, alternate interface 74 also communicates with application model 72 to transmit commands from an operator to MR system control 44 and to receive operator interface updates in response to the executed commands. When a person desires to interact with or access information associated with imaging system 40 from at least one remote operator console (i.e., any operator console or workstation that communicates with application model 72 via network 14, such as workstations 16 or workstations 20, 30), a local user interface included in that remote operator console communicates with application model 72 via network 14. In response, application model 72 generates an alternate application user interface to be provided to that remote operator console. Accordingly, the person at this remote operator console can transmit commands to application model 72 via the alternate interface and network 14, and receive user interface updates from application model 72 via network 14 and the alternate interface. For example, a person on workstation 20 initiates a connection through a local user interface (not shown) included in computer 22. The

connection request is transmitted to application model 72 via network 14. Application model 72 generates an alternate application user interface 24 (alternate interface 24 having similar characteristics to alternate interface 74) to be provided to computer 22. Then the person can drive application model 72 via alternate interface 24 and network 14, thereby specifying commands to application model 72 and receiving user interface updates from application model 72 in response to these commands.

A local user interface is preferably included in each remote operator console to initiate connection to imaging system 40 or collaboration control 54, or to permit local access of features and/or data located at a given remote operator console (e.g., reviewing images already stored in a given remote operator console). Workstation 30 and its alternate application user interface 34 are similar to workstation 20 and alternate interface 24, respectively, discussed above. However, it should be understood that each of alternate interface 24, alternate interface 34, or alternate interface 74 would only be generated as needed (i.e., when a person at the corresponding operator console or workstation requests a connection to an imaging system or otherwise wishes to communicate with another operator console or workstation). For example, if main operator console 52 and workstation 20 are accessed, then alternate interface 24 would be generated (such that application user interface 70 and/or alternate interface 24 can drive application model 72) but alternate interfaces 74 and 34 would not exist.

In this manner, a given imaging system can be simultaneously accessed by one or more persons located at local and/or remote locations. All the persons accessing a given imaging system at a given time may be shown similar, if not identical, information in real-time or quasi real-time via corresponding user interfaces, and each may also have the ability to effect the displayed information for him/herself as well as others. Preferably, commands from each of the active user interfaces

	are processed by the application model, and the application model transmits corresponding user interface updates to all of the active user interfaces. Real-time or quasi real-time refers to continuous monitoring, execution, and updating of operator commands and results as rapidly as possible, as constrained by system performance. Several examples illustrating uses of the remote and/or collaborative control scheme are provided below. For example, a scanner operator at main operator console 52 and a physician at a reading room (typically remotely located with respect to imaging system 40, such as workstation 20) wish to confer about the orientation and location of the next imaging or scan slice(s) of a patient presently positioned within magnet assembly 42. Using application user interface 70 and alternate interface 24, the scanner operator and the physician, respectively, can "share" a graphical prescription tool to interactively collaborate on the orientation and location of the next imaging slice(s) in real-time. The information displayed on displays 62 and 26 would be the same, such that each would see prescriptions made by the other; and control panel 64, input device 66, or input device 28 would be utilized by the scanner operator or physician, respectively. In another example, the scanner operator at main operator console 52 may set up a real-time scan (e.g., specify initial parameters and properly position the patient) of the patient positioned within magnet assembly 42. Then the scanner operator can request the physician in a remote reading room (e.g., workstation 20) to operate (e.g., initiate and henceforth control) imaging system 40. This permits the physician to control the rest of the scan session (e.g., resolution of images, length of scan time, scan slice orientation, etc.) without being physically present at either operator console 50 or 52. This and the previous example are also applicable when one or more mobile scanners collaborating with a central facility of physicians or diagnosticians are used in the event of a natural

	disaster, in a battlefield, a sporting event, etc. In still another example, training, servicing, troubleshooting, performance evaluation, and/or design evaluation may be carried out with the remote and/or collaborative control scheme. A person (e.g., a central site service engineer) at a central site service workstation can remotely monitor the actions of a scanner operator at the local operator console or at any of workstation 16. Based on this monitoring, the person may provide the scanner operator with instructions via telephone and/or an alternate application user interface regarding correct operation of that imaging system. Similarly, training of the scanner operator(s) may be provided via remote monitoring and collaboration. Moreover, the scanner operators may be evaluated on their performance of specific tasks by a manager or a system designer (e.g., length of time to set up a scan; number of prescription modifications, etc.) to provide job performance data or next generation design data, respectively. Alternatively, when the scanner operator is at the local operator console (so is proximate to a magnet assembly), the engineer may troubleshoot problems associated with that imaging system. The engineer may remotely monitor the imaging system's outputs (relative to the scanner operator and/or engineer's inputs) and request the scanner operator to perform equipment changes or configurations (e.g., placing various test objects within the magnet assembly) to determine the problem and possibly even the solution. In still yet another example, any of the imaging systems 12 or workstations 16 may be accessed for off-line review of its performance and activities by an off-line review workstation. Such off-line review is preferably performed after the remote and/or collaborative session with a given imaging system has been completed. The off-line review facilitates, among others, maintenance based on actual usage and simultaneous software upgrades." Page 9, line 3 – Page 12, line 25
wherein the second user interface is provided	"Each of workstations 16 includes a

in response to a request for remote or collaborative control of the imaging system at the second location; and	computer (including a memory and a processor), a display, and an input device. The display can include, but is not limited to, a cathode ray tube (CRT) display, a liquid crystal display (LCD), a light emitting diode (LED) display, a plasma display, a touch screen, a projection display, a printer, a plotter, etc. The input device can include, but is not limited to, a mouse, a joystick, a keyboard, a trackball, a touch screen, a light wand, a voice control device, and a custom keyboard/keypad. In FIG. 2, representative workstations 20, 30 are shown. Workstation 20 includes each of a display 26 and an input device 28 coupled to a computer 22. Workstation 30 similarly includes each of a display 36 and an input device 38 coupled to a computer 32. Alternate application user interfaces 24, 34 (to be described in detail hereinafter) are selectively included in computers 22, 32, respectively, and are coupled to communications network 14." Page 4, line 20 – Page 5, line 2 "When both magnet side operator console 50 and main operator console 52 are accessed, collaboration control 54 is configured to provide application user interface 70 to main operator console 52 and an alternate application user interface 74 to magnet side operator console 50. Application model 72 generates alternate application user interface 74 in response to the second local operator console being initially accessed while the first local operator console is already in use. Alternatively, application user interface 70 may remain with the first local operator console accessed (e.g., magnet side operator console 50) and the alternate interface 74 may be provided to the second operator console accessed (e.g., main operator console 52). Each of alternate application user interfaces 24, 34, 74 is similar to application user interface 70 and includes substantially the same functionality thereto. Each of alternate interfaces 24, 34, 74 is preferably an identical copy of all or a portion of application user interface 70, such that more than one person may simultaneously drive application model 72. In another embodiment,

each of alternate interfaces 24, 34, 74 may be a different interface from application user interface 70 but which is still configured to drive application model 72. Similar to application user interface 70, alternate interface 74 also communicates with application model 72 to transmit commands from an operator to MR system control 44 and to receive operator interface updates in response to the executed commands.

When a person desires to interact with or access information associated with imaging system 40 from at least one remote operator console (i.e., any operator console or workstation that communicates with application model 72 via network 14, such as workstations 16 or workstations 20, 30), a local user interface included in that remote operator console communicates with application model 72 via network 14. In response, application model 72 generates an alternate application user interface to be provided to that remote operator console. Accordingly, the person at this remote operator console can transmit commands to application model 72 via the alternate interface and network 14, and receive user interface updates from application model 72 via network 14 and the alternate interface.

For example, a person on workstation 20 initiates a connection through a local user interface (not shown) included in computer 22. The connection request is transmitted to application model 72 via network 14. Application model 72 generates an alternate application user interface 24 (alternate interface 24 having similar characteristics to alternate interface 74) to be provided to computer 22. Then the person can drive application model 72 via alternate interface 24 and network 14, thereby specifying commands to application model 72 and receiving user interface updates from application model 72 in response to these commands.

A local user interface is preferably included in each remote operator console to initiate connection to imaging system 40 or collaboration control 54, or to permit local access of features and/or data located at a given remote operator

	console (e.g., reviewing images already stored in a given remote operator console). Workstation 30 and its alternate application user interface 34 are similar to workstation 20 and alternate interface 24, respectively, discussed above. However, it should be understood that each of alternate interface 24, alternate interface 34, or alternate interface 74 would only be generated as needed (i.e., when a person at the corresponding operator console or workstation requests a connection to an imaging system or otherwise wishes to communicate with another operator console or workstation). For example, if main operator console 52 and workstation 20 are accessed, then alternate interface 24 would be generated (such that application user interface 70 and/or alternate interface 24 can drive application model 72) but alternate interfaces 74 and 34 would not exist." Page 9, line 3 – Page 10, line 24
wherein the apparatus is configured such that the application model can be controlled using the first user interface and the second user interface at about a same time.	"Collaboration control 54 is configured to permit one or more operators, local or remote, to interface with imaging system 40. Collaboration control 54 is further configured to permit real-time collaborative control from more than one operator console or workstation. Collaboration control 54 is still further configured to display the interfacing actions and images in real-time in all of the involved operator consoles and/or workstations. Thus, collaboration control 54 may provide a real-time user interface to each operator console or workstation connected to network 14 and which is desirous of controlling, viewing images, and/or otherwise being involved with activities relating to imaging system 40. In one embodiment, collaboration control 54 includes an application 68 comprised of at least an application user interface 70 and an application model 72. Application user interface 70 and application model 72 are preferably software. Alternatively, application user interface 70 and/or application model 72 may be firmware, hardware, software, and/or combinations thereof (such as an application specific integrated circuit (ASIC)). Collaboration control 54 preferably includes a processor and a memory with corresponding software.

Collaboration control 54 is in communication with MR system control 44 via application model 72 and an application server (not shown) included in MR system control 44. However, it is contemplated that the functionality of MR system control 44 and collaboration control 54 may be embodied in a single component. It is also contemplated that some of the functionality of MR system control 44 or collaboration control 54 may be performed in control 54 or control 44, respectively. Thus, MR system control 44 and collaboration control 54, alone or in combination, perform, among others, data acquisition, waveform or pulse sequence configuration, reconstruction, image presentation, human interface processing, and coordination of such interfacing activities when more than one operator console or workstation are being accessed by users.

Each operator at an operator console or workstation interacts with a given imaging system via an application user interface, application model 72, and network 14. The application user interface may be application user interface 70 (also referred to as the primary application user interface) in collaboration control 54 or an alternate application user interface (also referred to as the non-primary or secondary application user interface) (to be described in detail hereinafter). Preferably, application user interface 70 and application model 72 are in communication with each other and are open or accessible at all times for the lifetime of the application when environment 10 is operational.

When a local operator console (i.e., magnet side operator console 50 or main operator console 52) is accessed by an operator or user (e.g., a technologist, a physician, a service/maintenance provider, etc.), communication with imaging system 40 is provided via application 68 on collaboration control 54. Collaboration control 54 provides application user interface 70 to that local operator console. For example, application user interface 70 includes a graphical user interface (GUI) or other control or viewing mechanisms for the operator to interact with system 40. Through interface 70, the operator can specify an imaging or

	scan plane, specify the desired image contrast, initiate a scan, request display of stored images, etc. Commands made to interface 70 are communicated to application model 72. Application model 72 processes these commands and, in turn, communicates with MR system control 44 to complete the requested commands. Completed actions and data from imaging system 40 are transmitted to application model 72 via MR system control 44. Application model 72 may process such information to configure it into an appropriate update to application user interface 70. Application model 72 then transmits a user interface update to interface 70. In this manner, the operator at the local operator console will see the results of his/her request on display 56 and/or control panel 58. Application model 72 translates user interface commands into actions and calculations, and also receives results of a given scan or scanning session for presentation. As such, application model 72 is involved in, but not limited to, scanner set up (e.g., image contrast, pulse sequence timing, hardware settings, etc.); scanner control; real-time scanner control (e.g., real-time change(s) and/or prescription of image contrast, pulse sequence timing, hardware settings, etc.); timely presentation of one or more images; archiving; networking; and image presentation control for non-electronic formats, such as in film." Page 6, line 28 – Page 9, line 2 *See generally*, Page 10, line 25 – Page 13, line 22
31. An apparatus for remote or collaborative control of an imaging system, the apparatus comprising:	"Referring to FIG. 1, there is shown the major components of an imaging systems environment 10. Environment 10 includes imaging systems 12, a communications network 14, and workstations 16. Each of imaging systems 12 and workstations 16 is coupled to communications network 14. Imaging systems 12 include, but are not limited to, magnetic resonance (MR) imaging systems, computerized tomography (CT) imaging systems, nuclear medicine (NM) imaging systems, x-ray systems, and a variety of other imaging

	systems. It is contemplated that imaging systems 12 are not limited to medical imaging systems and may also include scanners or imaging systems for non-medical uses, such as, for security, geological surveys, etc. Communications network 14 is preferably an ethernet, fiber optic, or other applicable communication connection related to LAN, WAN, or wireless networking and is configured to utilize protocols such as TCP/IP, CORBA, or Java RMI. Each of workstations 16 can be located proximate or distal to any of imaging systems 12 as long as both are able to communicate with each other via, such as, communications network 14. Workstations 16 can include, but are not limited to, a central site service station, an off-line review station, a central site applications station, a remote reading station, an education/training station, and a remote operator control station." Page 4, lines 1 – 19 "A representative imaging system 40 is also shown in FIG. 2. Imaging system 40 is preferably an MR imaging system. However, it should be understood that exemplary embodiments may alternatively include other types of imaging systems, such as CT imaging systems and other medical imaging systems. Thus, imaging system 40 shown as an MR imaging system is for illustration purposes only and in no way limits the implementation of the exemplary embodiments using other types of imaging systems. Imaging system 40 includes a magnet assembly 42, an MR system control 44, gradient coil drivers 46, a radio frequency (RF) transceiver circuit 48, a magnet side operator console 50, a main operator console 52, and a collaboration control 54." Page 5, lines 3 – 13; *See e.g.*, Page 11, line 8 thru Page 12, line 25
first means for interfacing at a first location;	"Operator console 50 includes a display 56 coupled to a control panel 58, and an input device 60 coupled to control panel 58. Operator console 52 includes a display 62 coupled to a control panel 64, and an input device 66 coupled to control panel 64. Each of displays 56, 62 can include, but is not limited to, a CRT display, an LCD, an LED display, a plasma display, a touch screen, a projection display, a printer, a plotter, etc. Each of

	input devices 60, 66 is selected from a group including, but not limited to, a mouse, a joystick, a trackball, a touch screen, a light wand, a voice control device, and a custom keyboard/keypad. Each of control panels 58, 64 includes dedicated buttons, knobs, switches, slider indicators, LED indicators, etc., to provide additional interactive functionality. Operator consoles 50, 52 (also referred to as operator interfaces) are configured to enable the operator to control the production and visualization of images. Conventionally, operator console 50 is located proximate to magnet assembly 42. Operator console 50 is also referred to as a table side or scanner side operator console. Operator console 52 is also proximate magnet assembly 42 and is located outside of the scan room. As such, the operator avoids introducing objects into the scan room during image acquisition (e.g., metallic objects which may damage magnet assembly 42). The operator, who may operate imaging system 40 for long periods of time, also avoids exposure to radiation (whether ionizing (CT) or non-ionizing (MR)) repeatedly emitted from imaging system 40." Page 6, lines 8 – 27
second means for interfacing at a second location, in response to a request for remote or collaborative control of the imaging system at the second location; and	"When both magnet side operator console 50 and main operator console 52 are accessed, collaboration control 54 is configured to provide application user interface 70 to main operator console 52 and an alternate application user interface 74 to magnet side operator console 50. Application model 72 generates alternate application user interface 74 in response to the second local operator console being initially accessed while the first local operator console is already in use. Alternatively, application user interface 70 may remain with the first local operator console accessed (e.g., magnet side operator console 50) and the alternate interface 74 may be provided to the second operator console accessed (e.g., main operator console 52). Each of alternate application user interfaces 24, 34, 74 is similar to application user interface 70 and includes substantially the same functionality thereto. Each of alternate interfaces

	24, 34, 74 is preferably an identical copy of all or a portion of application user interface 70, such that more than one person may simultaneously drive application model 72. In another embodiment, each of alternate interfaces 24, 34, 74 may be a different interface from application user interface 70 but which is still configured to drive application model 72. Similar to application user interface 70, alternate interface 74 also communicates with application model 72 to transmit commands from an operator to MR system control 44 and to receive operator interface updates in response to the executed commands. When a person desires to interact with or access information associated with imaging system 40 from at least one remote operator console (i.e., any operator console or workstation that communicates with application model 72 via network 14, such as workstations 16 or workstations 20, 30), a local user interface included in that remote operator console communicates with application model 72 via network 14. In response, application model 72 generates an alternate application user interface to be provided to that remote operator console. Accordingly, the person at this remote operator console can transmit commands to application model 72 via the alternate interface and network 14, and receive user interface updates from application model 72 via network 14 and the alternate interface. For example, a person on workstation 20 initiates a connection through a local user interface (not shown) included in computer 22. The connection request is transmitted to application model 72 via network 14. Application model 72 generates an alternate application user interface 24 (alternate interface 24 having similar characteristics to alternate interface 74) to be provided to computer 22. Then the person can drive application model 72 via alternate interface 24 and network 14, thereby specifying commands to application model 72 and receiving user interface updates from application model 72 in

response to these commands.

A local user interface is preferably included in each remote operator console to initiate connection to imaging system 40 or collaboration control 54, or to permit local access of features and/or data located at a given remote operator console (e.g., reviewing images already stored in a given remote operator console). Workstation 30 and its alternate application user interface 34 are similar to workstation 20 and alternate interface 24, respectively, discussed above. However, it should be understood that each of alternate interface 24, alternate interface 34, or alternate interface 74 would only be generated as needed (i.e., when a person at the corresponding operator console or workstation requests a connection to an imaging system or otherwise wishes to communicate with another operator console or workstation). For example, if main operator console 52 and workstation 20 are accessed, then alternate interface 24 would be generated (such that application user interface 70 and/or alternate interface 24 can drive application model 72) but alternate interfaces 74 and 34 would not exist.

In this manner, a given imaging system can be simultaneously accessed by one or more persons located at local and/or remote locations. All the persons accessing a given imaging system at a given time may be shown similar, if not identical, information in real-time or quasi real-time via corresponding user interfaces, and each may also have the ability to effect the displayed information for him/herself as well as others. Preferably, commands from each of the active user interfaces are processed by the application model, and the application model transmits corresponding user interface updates to all of the active user interfaces. Real-time or quasi real-time refers to continuous monitoring, execution, and updating of operator commands and results as rapidly as possible, as constrained by system performance. Several examples illustrating uses of the remote and/or collaborative control scheme are provided below.

	For example, a scanner operator at main operator console 52 and a physician at a reading room (typically remotely located with respect to imaging system 40, such as workstation 20) wish to confer about the orientation and location of the next imaging or scan slice(s) of a patient presently positioned within magnet assembly 42. Using application user interface 70 and alternate interface 24, the scanner operator and the physician, respectively, can "share" a graphical prescription tool to interactively collaborate on the orientation and location of the next imaging slice(s) in real-time. The information displayed on displays 62 and 26 would be the same, such that each would see prescriptions made by the other; and control panel 64, input device 66, or input device 28 would be utilized by the scanner operator or physician, respectively. In another example, the scanner operator at main operator console 52 may set up a real-time scan (e.g., specify initial parameters and properly position the patient) of the patient positioned within magnet assembly 42. Then the scanner operator can request the physician in a remote reading room (e.g., workstation 20) to operate (e.g., initiate and henceforth control) imaging system 40. This permits the physician to control the rest of the scan session (e.g., resolution of images, length of scan time, scan slice orientation, etc.) without being physically present at either operator console 50 or 52. This and the previous example are also applicable when one or more mobile scanners collaborating with a central facility of physicians or diagnosticians are used in the event of a natural disaster, in a battlefield, a sporting event, etc. In still another example, training, servicing, troubleshooting, performance evaluation, and/or design evaluation may be carried out with the remote and/or collaborative control scheme. A person (e.g., a central site service engineer) at a central site service workstation can remotely monitor the actions of a scanner operator at the local operator console or at any of workstation 16. Based on this monitoring, the person may provide

	the scanner operator with instructions via telephone and/or an alternate application user interface regarding correct operation of that imaging system. Similarly, training of the scanner operator(s) may be provided via remote monitoring and collaboration. Moreover, the scanner operators may be evaluated on their performance of specific tasks by a manager or a system designer (e.g., length of time to set up a scan; number of prescription modifications, etc.) to provide job performance data or next generation design data, respectively. Alternatively, when the scanner operator is at the local operator console (so is proximate to a magnet assembly), the engineer may troubleshoot problems associated with that imaging system. The engineer may remotely monitor the imaging system's outputs (relative to the scanner operator and/or engineer's inputs) and request the scanner operator to perform equipment changes or configurations (e.g., placing various test objects within the magnet assembly) to determine the problem and possibly even the solution. In still yet another example, any of the imaging systems 12 or workstations 16 may be accessed for off-line review of its performance and activities by an off-line review workstation. Such off-line review is preferably performed after the remote and/or collaborative session with a given imaging system has been completed. The off-line review facilitates, among others, maintenance based on actual usage and simultaneous software upgrades." Page 9, line 3 – Page 12, line 25
means for updating located at the first location and configured to receive a command from the second means for interfacing and transmit an interface update to the second means for interfacing in response to the command, the means for updating being configured to automatically send interface updates to refresh the second means for interfacing.	"Communications network 14 is preferably an ethernet, fiber optic, or other applicable communication connection related to LAN, WAN, or wireless networking and is configured to utilize protocols such as TCP/IP, CORBA, or Java RMI. Each of workstations 16 can be located proximate or distal to any of imaging systems 12 as long as both are able to communicate with each other via, such as, communications network 14. Workstations 16 can include, but are not limited to, a central site service station, an off-line review station, a central site applications station, a remote reading station, an education/training station, and a

	remote operator control station." Page 4, lines 11 – 19 "In one embodiment, collaboration control 54 includes an application 68 comprised of at least an application user interface 70 and an application model 72. Application user interface 70 and application model 72 are preferably software. Alternatively, application user interface 70 and/or application model 72 may be firmware, hardware, software, and/or combinations thereof (such as an application specific integrated circuit (ASIC)). Collaboration control 54 preferably includes a processor and a memory with corresponding software. Collaboration control 54 is in communication with MR system control 44 via application model 72 and an application server (not shown) included in MR system control 44. However, it is contemplated that the functionality of MR system control 44 and collaboration control 54 may be embodied in a single component. It is also contemplated that some of the functionality of MR system control 44 or collaboration control 54 may be performed in control 54 or control 44, respectively. Thus, MR system control 44 and collaboration control 54, alone or in combination, perform, among others, data acquisition, waveform or pulse sequence configuration, reconstruction, image presentation, human interface processing, and coordination of such interfacing activities when more than one operator console or workstation are being accessed by users. Each operator at an operator console or workstation interacts with a given imaging system via an application user interface, application model 72, and network 14. The application user interface may be application user interface 70 (also referred to as the primary application user interface) in collaboration control 54 or an alternate application user interface (also referred to as the non-primary or secondary application user interface) (to be described in detail hereinafter). Preferably, application user interface 70 and application model 72 are in communication with each other and are open or accessible at all times for the lifetime of the application when environment 10 is

	operational. When a local operator console (i.e., magnet side operator console 50 or main operator console 52) is accessed by an operator or user (e.g., a technologist, a physician, a service/maintenance provider, etc.), communication with imaging system 40 is provided via application 68 on collaboration control 54. Collaboration control 54 provides application user interface 70 to that local operator console. For example, application user interface 70 includes a graphical user interface (GUI) or other control or viewing mechanisms for the operator to interact with system 40. Through interface 70, the operator can specify an imaging or scan plane, specify the desired image contrast, initiate a scan, request display of stored images, etc. Commands made to interface 70 are communicated to application model 72. Application model 72 processes these commands and, in turn, communicates with MR system control 44 to complete the requested commands. Completed actions and data from imaging system 40 are transmitted to application model 72 via MR system control 44. Application model 72 may process such information to configure it into an appropriate update to application user interface 70. Application model 72 then transmits a user interface update to interface 70. In this manner, the operator at the local operator console will see the results of his/her request on display 56 and/or control panel 58. Application model 72 translates user interface commands into actions and calculations, and also receives results of a given scan or scanning session for presentation. As such, application model 72 is involved in, but not limited to, scanner set up (e.g., image contrast, pulse sequence timing, hardware settings, etc.); scanner control; real-time scanner control (e.g., real-time change(s) and/or prescription of image contrast, pulse sequence timing, hardware settings, etc.); timely presentation of one or more images; archiving; networking; and image presentation control for non-electronic formats, such as in film." Page 7, line 8 – Page 9, line 2

46. An image generated by the steps comprising:	
providing a first user interface at a first location and a second user interface at a second location;	"Operator console 50 includes a display 56 coupled to a control panel 58, and an input device 60 coupled to control panel 58. Operator console 52 includes a display 62 coupled to a control panel 64, and an input device 66 coupled to control panel 64. Each of displays 56, 62 can include, but is not limited to, a CRT display, an LCD, an LED display, a plasma display, a touch screen, a projection display, a printer, a plotter, etc. Each of input devices 60, 66 is selected from a group including, but not limited to, a mouse, a joystick, a trackball, a touch screen, a light wand, a voice control device, and a custom keyboard/keypad. Each of control panels 58, 64 includes dedicated buttons, knobs, switches, slider indicators, LED indicators, etc., to provide additional interactive functionality. Operator consoles 50, 52 (also referred to as operator interfaces) are configured to enable the operator to control the production and visualization of images. Conventionally, operator console 50 is located proximate to magnet assembly 42. Operator console 50 is also referred to as a table side or scanner side operator console. Operator console 52 is also proximate magnet assembly 42 and is located outside of the scan room. As such, the operator avoids introducing objects into the scan room during image acquisition (e.g., metallic objects which may damage magnet assembly 42). The operator, who may operate imaging system 40 for long periods of time, also avoids exposure to radiation (whether ionizing (CT) or non-ionizing (MR)) repeatedly emitted from imaging system 40." Page 6, lines 8 – 27 "Each of workstations 16 includes a computer (including a memory and a processor), a display, and an input device. The display can include, but is not limited to, a cathode ray tube (CRT) display, a liquid crystal display (LCD), a light emitting diode (LED) display, a plasma

	display, a touch screen, a projection display, a printer, a plotter, etc. The input device can include, but is not limited to, a mouse, a joystick, a keyboard, a trackball, a touch screen, a light wand, a voice control device, and a custom keyboard/keypad. In FIG. 2, representative workstations 20, 30 are shown. Workstation 20 includes each of a display 26 and an input device 28 coupled to a computer 22. Workstation 30 similarly includes each of a display 36 and an input device 38 coupled to a computer 32. Alternate application user interfaces 24, 34 (to be described in detail hereinafter) are selectively included in computers 22, 32, respectively, and are coupled to communications network 14." Page 4, line 20 – Page 5, line 2 "When both magnet side operator console 50 and main operator console 52 are accessed, collaboration control 54 is configured to provide application user interface 70 to main operator console 52 and an alternate application user interface 74 to magnet side operator console 50. Application model 72 generates alternate application user interface 74 in response to the second local operator console being initially accessed while the first local operator console is already in use. Alternatively, application user interface 70 may remain with the first local operator console accessed (e.g., magnet side operator console 50) and the alternate interface 74 may be provided to the second operator console accessed (e.g., main operator console 52). Each of alternate application user interfaces 24, 34, 74 is similar to application user interface 70 and includes substantially the same functionality thereto. Each of alternate interfaces 24, 34, 74 is preferably an identical copy of all or a portion of application user interface 70, such that more than one person may simultaneously drive application model 72. In another embodiment, each of alternate interfaces 24, 34, 74 may be a different interface from application user interface 70 but which is still configured to drive application model 72. Similar to application user interface 70, alternate interface 74 also communicates with

application model 72 to transmit commands from an operator to MR system control 44 and to receive operator interface updates in response to the executed commands.

When a person desires to interact with or access information associated with imaging system 40 from at least one remote operator console (i.e., any operator console or workstation that communicates with application model 72 via network 14, such as workstations 16 or workstations 20, 30), a local user interface included in that remote operator console communicates with application model 72 via network 14. In response, application model 72 generates an alternate application user interface to be provided to that remote operator console. Accordingly, the person at this remote operator console can transmit commands to application model 72 via the alternate interface and network 14, and receive user interface updates from application model 72 via network 14 and the alternate interface.

For example, a person on workstation 20 initiates a connection through a local user interface (not shown) included in computer 22. The connection request is transmitted to application model 72 via network 14. Application model 72 generates an alternate application user interface 24 (alternate interface 24 having similar characteristics to alternate interface 74) to be provided to computer 22. Then the person can drive application model 72 via alternate interface 24 and network 14, thereby specifying commands to application model 72 and receiving user interface updates from application model 72 in response to these commands.

A local user interface is preferably included in each remote operator console to initiate connection to imaging system 40 or collaboration control 54, or to permit local access of features and/or data located at a given remote operator console (e.g., reviewing images already stored in a given remote operator console). Workstation 30 and its alternate application user interface 34 are similar to workstation 20 and alternate interface 24, respectively, discussed above. However, it

	should be understood that each of alternate interface 24, alternate interface 34, or alternate interface 74 would only be generated as needed (i.e., when a person at the corresponding operator console or workstation requests a connection to an imaging system or otherwise wishes to communicate with another operator console or workstation). For example, if main operator console 52 and workstation 20 are accessed, then alternate interface 24 would be generated (such that application user interface 70 and/or alternate interface 24 can drive application model 72) but alternate interfaces 74 and 34 would not exist." Page 9, line 3 – Page 10, line 24
commanding an imaging system located at a third location with a command from at least one of the first user interface and the second user interface;	"Referring to FIG. 1, there is shown the major components of an imaging systems environment 10. Environment 10 includes imaging systems 12, a communications network 14, and workstations 16. Each of imaging systems 12 and workstations 16 is coupled to communications network 14. Imaging systems 12 include, but are not limited to, magnetic resonance (MR) imaging systems, computerized tomography (CT) imaging systems, nuclear medicine (NM) imaging systems, x-ray systems, and a variety of other imaging systems. It is contemplated that imaging systems 12 are not limited to medical imaging systems and may also include scanners or imaging systems for non-medical uses, such as, for security, geological surveys, etc. Communications network 14 is preferably an ethernet, fiber optic, or other applicable communication connection related to LAN, WAN, or wireless networking and is configured to utilize protocols such as TCP/IP, CORBA, or Java RMI. Each of workstations 16 can be located proximate or distal to any of imaging systems 12 as long as both are able to communicate with each other via, such as, communications network 14. Workstations 16 can include, but are not limited to, a central site service station, an off-line review station, a central site applications station, a remote reading station, an education/training station, and a remote operator control station." Page 4, lines 1 – 19; *See e.g.*, Page 11, line 8 thru Page 12, line 25

	"MR system control 44 receives commands from an operator (via collaboration control 54) regarding scan parameters and sequences to be performed. MR system control 44 configures and outputs various signals (including pulse sequence data specifying the timing, length, strength, and shape of the pulses) for the remaining system components to carry out the desired scan sequence. MR system control 44 also receives sensor data and acquired image data from magnet assembly 42 and circuit 48 for processing (such as image data reconstruction), storage, and transmission to the operator." Page 5, line 24 thru Page 6, line 2 "Commands made to interface 70 are communicated to application model 72. Application model 72 processes these commands and, in turn, communicates with MR system control 44 to complete the requested commands. Completed actions and data from imaging system 40 are transmitted to application model 72 via MR system control 44. Application model 72 may process such information to configure it into an appropriate update to application user interface 70. Application model 72 then transmits a user interface update to interface 70. In this manner, the operator at the local operator console will see the results of his/her request on display 56 and/or control panel 58." Page 8, lines 15-23
generating an interface update in response to the command to the imaging system, the interface update including data representative of the image; and	Application model 72 may process such information to configure it into an appropriate update to application user interface 70. Application model 72 then transmits a user interface update to interface 70. In this manner, the operator at the local operator console will see the results of his/her request on display 56 and/or control panel 58. Page 8, lines 19-23
providing the interface update to the first user interface and the second user interface,	"In another embodiment, each of alternate interfaces 24, 34, 74 may be a different interface from application user interface 70 but which is still configured to drive application model 72. Similar to application user interface 70, alternate interface 74 also communicates with application model 72 to transmit commands from an operator to MR system control 44 and to receive operator interface updates

	in response to the executed commands. When a person desires to interact with or access information associated with imaging system 40 from at least one remote operator console (i.e., any operator console or workstation that communicates with application model 72 via network 14, such as workstations 16 or workstations 20, 30), a local user interface included in that remote operator console communicates with application model 72 via network 14. In response, application model 72 generates an alternate application user interface to be provided to that remote operator console. Accordingly, the person at this remote operator console can transmit commands to application model 72 via the alternate interface and network 14, and receive user interface updates from application model 72 via network 14 and the alternate interface." Page 9, lines 16 – Page 10, line 2 "Preferably, commands from each of the active user interfaces are processed by the application model, and the application model transmits corresponding user interface updates to all of the active user interfaces. Real-time or quasi real-time refers to continuous monitoring, execution, and updating of operator commands and results as rapidly as possible, as constrained by system performance. Several examples illustrating uses of the remote and/or collaborative control scheme are provided below. For example, a scanner operator at main operator console 52 and a physician at a reading room (typically remotely located with respect to imaging system 40, such as workstation 20) wish to confer about the orientation and location of the next imaging or scan slice(s) of a patient presently positioned within magnet assembly 42. Using application user interface 70 and alternate interface 24, the scanner operator and the physician, respectively, can "share" a graphical prescription tool to interactively collaborate on the orientation and location of the next imaging slice(s) in real-time. The information displayed on displays

	62 and 26 would be the same, such that each would see prescriptions made by the other; and control panel 64, input device 66, or input device 28 would be utilized by the scanner operator or physician, respectively. In another example, the scanner operator at main operator console 52 may set up a real-time scan (e.g., specify initial parameters and properly position the patient) of the patient positioned within magnet assembly 42. Then the scanner operator can request the physician in a remote reading room (e.g., workstation 20) to operate (e.g., initiate and henceforth control) imaging system 40. This permits the physician to control the rest of the scan session (e.g., resolution of images, length of scan time, scan slice orientation, etc.) without being physically present at either operator console 50 or 52. This and the previous example are also applicable when one or more mobile scanners collaborating with a central facility of physicians or diagnosticians are used in the event of a natural disaster, in a battlefield, a sporting event, etc. In still another example, training, servicing, troubleshooting, performance evaluation, and/or design evaluation may be carried out with the remote and/or collaborative control scheme. A person (e.g., a central site service engineer) at a central site service workstation can remotely monitor the actions of a scanner operator at the local operator console or at any of workstation 16. Based on this monitoring, the person may provide the scanner operator with instructions via telephone and/or an alternate application user interface regarding correct operation of that imaging system. Similarly, training of the scanner operator(s) may be provided via remote monitoring and collaboration. Moreover, the scanner operators may be evaluated on their performance of specific tasks by a manager or a system designer (e.g., length of time to set up a scan; number of prescription modifications, etc.) to provide job performance data or next generation design data, respectively. Alternatively, when the scanner operator is at the local operator console (so is

	proximate to a magnet assembly), the engineer may troubleshoot problems associated with that imaging system. The engineer may remotely monitor the imaging system's outputs (relative to the scanner operator and/or engineer's inputs) and request the scanner operator to perform equipment changes or configurations (e.g., placing various test objects within the magnet assembly) to determine the problem and possibly even the solution. In still yet another example, any of the imaging systems 12 or workstations 16 may be accessed for off-line review of its performance and activities by an off-line review workstation. Such off-line review is preferably performed after the remote and/or collaborative session with a given imaging system has been completed. The off-line review facilitates, among others, maintenance based on actual usage and simultaneous software upgrades." Page 11, line 1 – Page 12, line 25
wherein the second user interface is provided at the second location when a remote or collaborative control of the imaging system is requested by a user at the second location.	*See* FIG. 2
66. A system for remote or collaborative control of an imaging system, comprising:	"Referring to FIG. 1, there is shown the major components of an imaging systems environment 10. Environment 10 includes imaging systems 12, a communications network 14, and workstations 16. Each of imaging systems 12 and workstations 16 is coupled to communications network 14. Imaging systems 12 include, but are not limited to, magnetic resonance (MR) imaging systems, computerized tomography (CT) imaging systems, nuclear medicine (NM) imaging systems, x-ray systems, and a variety of other imaging systems. It is contemplated that imaging systems 12 are not limited to medical imaging systems and may also include scanners or imaging systems for non-medical uses, such as, for security, geological surveys, etc. Communications network 14 is preferably an ethernet, fiber optic, or other applicable communication connection related to LAN, WAN, or wireless networking and is configured to utilize

	protocols such as TCP/IP, CORBA, or Java RMI. Each of workstations 16 can be located proximate or distal to any of imaging systems 12 as long as both are able to communicate with each other via, such as, communications network 14. Workstations 16 can include, but are not limited to, a central site service station, an off-line review station, a central site applications station, a remote reading station, an education/training station, and a remote operator control station." Page 4, lines 1 – 19 "A representative imaging system 40 is also shown in FIG. 2. Imaging system 40 is preferably an MR imaging system. However, it should be understood that exemplary embodiments may alternatively include other types of imaging systems, such as CT imaging systems and other medical imaging systems. Thus, imaging system 40 shown as an MR imaging system is for illustration purposes only and in no way limits the implementation of the exemplary embodiments using other types of imaging systems. Imaging system 40 includes a magnet assembly 42, an MR system control 44, gradient coil drivers 46, a radio frequency (RF) transceiver circuit 48, a magnet side operator console 50, a main operator console 52, and a collaboration control 54." Page 5, lines 3 – 13; *See e.g.*, Page 11, line 8 thru Page 12, line 25
an application model configured to be in communication with an imaging device;	"In one embodiment, collaboration control 54 includes an application 68 comprised of at least an application user interface 70 and an application model 72. Application user interface 70 and application model 72 are preferably software. Alternatively, application user interface 70 and/or application model 72 may be firmware, hardware, software, and/or combinations thereof (such as an application specific integrated circuit (ASIC)). Collaboration control 54 preferably includes a processor and a memory with corresponding software. Collaboration control 54 is in communication with MR system control 44 via application model 72 and an application server (not shown) included in MR system control 44. However, it is contemplated that the functionality of MR system control 44 and collaboration control

54 may be embodied in a single component. It is also contemplated that some of the functionality of MR system control 44 or collaboration control 54 may be performed in control 54 or control 44, respectively. Thus, MR system control 44 and collaboration control 54, alone or in combination, perform, among others, data acquisition, waveform or pulse sequence configuration, reconstruction, image presentation, human interface processing, and coordination of such interfacing activities when more than one operator console or workstation are being accessed by users.

Each operator at an operator console or workstation interacts with a given imaging system via an application user interface, application model 72, and network 14. The application user interface may be application user interface 70 (also referred to as the primary application user interface) in collaboration control 54 or an alternate application user interface (also referred to as the non-primary or secondary application user interface) (to be described in detail hereinafter). Preferably, application user interface 70 and application model 72 are in communication with each other and are open or accessible at all times for the lifetime of the application when environment 10 is operational.

When a local operator console (i.e., magnet side operator console 50 or main operator console 52) is accessed by an operator or user (e.g., a technologist, a physician, a service/maintenance provider, etc.), communication with imaging system 40 is provided via application 68 on collaboration control 54. Collaboration control 54 provides application user interface 70 to that local operator console. For example, application user interface 70 includes a graphical user interface (GUI) or other control or viewing mechanisms for the operator to interact with system 40. Through interface 70, the operator can specify an imaging or scan plane, specify the desired image contrast, initiate a scan, request display of stored images, etc.

Commands made to interface 70 are communicated to application model 72. Application model 72 processes these commands

	and, in turn, communicates with MR system control 44 to complete the requested commands. Completed actions and data from imaging system 40 are transmitted to application model 72 via MR system control 44. Application model 72 may process such information to configure it into an appropriate update to application user interface 70. Application model 72 then transmits a user interface update to interface 70. In this manner, the operator at the local operator console will see the results of his/her request on display 56 and/or control panel 58. Application model 72 translates user interface commands into actions and calculations, and also receives results of a given scan or scanning session for presentation. As such, application model 72 is involved in, but not limited to, scanner set up (e.g., image contrast, pulse sequence timing, hardware settings, etc.); scanner control; real-time scanner control (e.g., real-time change(s) and/or prescription of image contrast, pulse sequence timing, hardware settings, etc.); timely presentation of one or more images; archiving; networking; and image presentation control for non-electronic formats, such as in film." Page 7, line 8 – Page 9, line 2
a first user interface configured to control the application model; and	"Operator console 50 includes a display 56 coupled to a control panel 58, and an input device 60 coupled to control panel 58. Operator console 52 includes a display 62 coupled to a control panel 64, and an input device 66 coupled to control panel 64. Each of displays 56, 62 can include, but is not limited to, a CRT display, an LCD, an LED display, a plasma display, a touch screen, a projection display, a printer, a plotter, etc. Each of input devices 60, 66 is selected from a group including, but not limited to, a mouse, a joystick, a trackball, a touch screen, a light wand, a voice control device, and a custom keyboard/keypad. Each of control panels 58, 64 includes dedicated buttons, knobs, switches, slider indicators, LED indicators, etc., to provide additional interactive functionality. Operator consoles 50, 52 (also referred to as operator interfaces) are configured to enable the operator to control the production and visualization

	of images. Conventionally, operator console 50 is located proximate to magnet assembly 42. Operator console 50 is also referred to as a table side or scanner side operator console. Operator console 52 is also proximate magnet assembly 42 and is located outside of the scan room. As such, the operator avoids introducing objects into the scan room during image acquisition (e.g., metallic objects which may damage magnet assembly 42). The operator, who may operate imaging system 40 for long periods of time, also avoids exposure to radiation (whether ionizing (CT) or non-ionizing (MR)) repeatedly emitted from imaging system 40." Page 6, lines 8 – 27
a second user interface configured to control the application model;	"Each of workstations 16 includes a computer (including a memory and a processor), a display, and an input device. The display can include, but is not limited to, a cathode ray tube (CRT) display, a liquid crystal display (LCD), a light emitting diode (LED) display, a plasma display, a touch screen, a projection display, a printer, a plotter, etc. The input device can include, but is not limited to, a mouse, a joystick, a keyboard, a trackball, a touch screen, a light wand, a voice control device, and a custom keyboard/keypad. In FIG. 2, representative workstations 20, 30 are shown. Workstation 20 includes each of a display 26 and an input device 28 coupled to a computer 22. Workstation 30 similarly includes each of a display 36 and an input device 38 coupled to a computer 32. Alternate application user interfaces 24, 34 (to be described in detail hereinafter) are selectively included in computers 22, 32, respectively, and are coupled to communications network 14." Page 4, line 20 – Page 5, line 2 "When both magnet side operator console 50 and main operator console 52 are accessed, collaboration control 54 is configured to provide application user interface 70 to main operator console 52 and an alternate application user interface 74 to magnet side operator console 50. Application model 72 generates alternate application user interface 74 in response to the second local operator console being initially

	accessed while the first local operator console is already in use. Alternatively, application user interface 70 may remain with the first local operator console accessed (e.g., magnet side operator console 50) and the alternate interface 74 may be provided to the second operator console accessed (e.g., main operator console 52). Each of alternate application user interfaces 24, 34, 74 is similar to application user interface 70 and includes substantially the same functionality thereto. Each of alternate interfaces 24, 34, 74 is preferably an identical copy of all or a portion of application user interface 70, such that more than one person may simultaneously drive application model 72. In another embodiment, each of alternate interfaces 24, 34, 74 may be a different interface from application user interface 70 but which is still configured to drive application model 72. Similar to application user interface 70, alternate interface 74 also communicates with application model 72 to transmit commands from an operator to MR system control 44 and to receive operator interface updates in response to the executed commands. When a person desires to interact with or access information associated with imaging system 40 from at least one remote operator console (i.e., any operator console or workstation that communicates with application model 72 via network 14, such as workstations 16 or workstations 20, 30), a local user interface included in that remote operator console communicates with application model 72 via network 14. In response, application model 72 generates an alternate application user interface to be provided to that remote operator console. Accordingly, the person at this remote operator console can transmit commands to application model 72 via the alternate interface and network 14, and receive user interface updates from application model 72 via network 14 and the alternate interface. For example, a person on workstation 20 initiates a connection through a local user interface (not shown) included in computer 22. The connection request is transmitted to application

	model 72 via network 14. Application model 72 generates an alternate application user interface 24 (alternate interface 24 having similar characteristics to alternate interface 74) to be provided to computer 22. Then the person can drive application model 72 via alternate interface 24 and network 14, thereby specifying commands to application model 72 and receiving user interface updates from application model 72 in response to these commands. A local user interface is preferably included in each remote operator console to initiate connection to imaging system 40 or collaboration control 54, or to permit local access of features and/or data located at a given remote operator console (e.g., reviewing images already stored in a given remote operator console). Workstation 30 and its alternate application user interface 34 are similar to workstation 20 and alternate interface 24, respectively, discussed above. However, it should be understood that each of alternate interface 24, alternate interface 34, or alternate interface 74 would only be generated as needed (i.e., when a person at the corresponding operator console or workstation requests a connection to an imaging system or otherwise wishes to communicate with another operator console or workstation). For example, if main operator console 52 and workstation 20 are accessed, then alternate interface 24 would be generated (such that application user interface 70 and/or alternate interface 24 can drive application model 72) but alternate interfaces 74 and 34 would not exist." Page 9, line 3 – Page 10, line 24
wherein the application model is configured such that it may be collaboratively controlled by the first user interface and the second user interface.	"Application model 72 generates alternate application user interface 74 in response to the second local operator console being initially accessed while the first local operator console is already in use. Alternatively, application user interface 70 may remain with the first local operator console accessed (e.g., magnet side operator console 50) and the alternate interface 74 may be provided to the second operator console accessed (e.g., main operator console 52). Each of alternate application user

	interfaces 24, 34, 74 is similar to application user interface 70 and includes substantially the same functionality thereto. Each of alternate interfaces 24, 34, 74 is preferably an identical copy of all or a portion of application user interface 70, such that more than one person may simultaneously drive application model 72. In another embodiment, each of alternate interfaces 24, 34, 74 may be a different interface from application user interface 70 but which is still configured to drive application model 72. Similar to application user interface 70, alternate interface 74 also communicates with application model 72 to transmit commands from an operator to MR system control 44 and to receive operator interface updates in response to the executed commands. When a person desires to interact with or access information associated with imaging system 40 from at least one remote operator console (i.e., any operator console or workstation that communicates with application model 72 via network 14, such as workstations 16 or workstations 20, 30), a local user interface included in that remote operator console communicates with application model 72 via network 14. In response, application model 72 generates an alternate application user interface to be provided to that remote operator console. Accordingly, the person at this remote operator console can transmit commands to application model 72 via the alternate interface and network 14, and receive user interface updates from application model 72 via network 14 and the alternate interface. For example, a person on workstation 20 initiates a connection through a local user interface (not shown) included in computer 22. The connection request is transmitted to application model 72 via network 14. Application model 72 generates an alternate application user interface 24 (alternate interface 24 having similar characteristics to alternate interface 74) to be provided to computer 22. Then the person can drive application model 72 via alternate interface

	24 and network 14, thereby specifying commands to application model 72 and receiving user interface updates from application model 72 in response to these commands. A local user interface is preferably included in each remote operator console to initiate connection to imaging system 40 or collaboration control 54, or to permit local access of features and/or data located at a given remote operator console (e.g., reviewing images already stored in a given remote operator console). Workstation 30 and its alternate application user interface 34 are similar to workstation 20 and alternate interface 24, respectively, discussed above. However, it should be understood that each of alternate interface 24, alternate interface 34, or alternate interface 74 would only be generated as needed (i.e., when a person at the corresponding operator console or workstation requests a connection to an imaging system or otherwise wishes to communicate with another operator console or workstation). For example, if main operator console 52 and workstation 20 are accessed, then alternate interface 24 would be generated (such that application user interface 70 and/or alternate interface 24 can drive application model 72) but alternate interfaces 74 and 34 would not exist. In this manner, a given imaging system can be simultaneously accessed by one or more persons located at local and/or remote locations. All the persons accessing a given imaging system at a given time may be shown similar, if not identical, information in real-time or quasi real-time via corresponding user interfaces, and each may also have the ability to effect the displayed information for him/herself as well as others. Preferably, commands from each of the active user interfaces are processed by the application model, and the application model transmits corresponding user interface updates to all of the active user interfaces. Real-time or quasi real-time refers to continuous monitoring, execution, and updating of operator commands and results as rapidly as possible, as constrained by system performance. Several

	examples illustrating uses of the remote and/or collaborative control scheme are provided below." Page 9, line 6 – Page 11, line 8

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-74 were rejected as anticipated or obvious in light of US Patent No. 5,715,823 to Wood et al. alone. Claims 1-4, 7-8, 10-11, 17-18, 21, 23-24, 26-27, 46-47, 52-53, 62, 66, 71, and 73 were rejected under 35 U.S.C. § 102(b) as anticipated by US Pat. No. 5,715,823 to Wood et al. Claims 9, 25, 12-16, 28-45, 48-51, 54-61, 63-65, 67-70, 72, and 74-76 are rejected under 35 U.S.C. §103(a) as being unpatentable over Wood et al. While not specifically called out, it appears that Claims 5-6, 19-20, and 22 were also rejected as unpatentable under § 103(a) over Wood in sections 13 and 14 of the Office Action dated April 6, 2005.

ARGUMENT

I. Legal Standards

Some claims have been rejected as unpatentable under 35 U.S.C. § 103(a) which states:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
>
> 35 U.S.C. § 103(a).

The legal standards under 35 U.S.C. § 103(a) are well-settled. Obviousness under 35 U.S.C. § 103(a) involves four factual inquiries: 1) the scope and content of the prior art; 2) the differences between the claims and the prior art; 3) the level of ordinary skill in the pertinent art; and 4) secondary considerations, if any, of nonobviousness. Litton Systems, Inc. v. Honeywell, Inc., 87 F.3d 1559, 1567, 39 U.S.P.Q.2d 1321, 1325 (Fed. Cir. 1996); see also Graham v. John Deere Co., 383 U.S. 1, 148 U.S.P.Q. 459 (1966).

A proper rejection under 35 U.S.C. § 103(a) requires that the Examiner establish prima facie obviousness. In re Piasecki, 745 F.2d 1468, 1471-72, 223 U.S.P.Q. 785, 787-88 (Fed. Cir. 1984). As recited in the MPEP, "[t]he examiner bears the initial burden of factually supporting any prima facie conclusion of obviousness. If the examiner does not produce a prima facie case, the applicant is under no obligation to submit evidence of nonobviousness." MPEP § 2142. Three basic criteria must be met to establish prima facie obviousness. MPEP § 2143. First, there must be some suggestion or motivation to modify a reference or combine teachings. *Id.* Second, there must be reasonable expectation of success. *Id.* Third, the prior art reference or references must teach or suggest all the claim limitations. *Id.*

II. Response to Examiner's Arguments

In addition to the argument made in Applicants' Appeals Brief the following argument is presented in response to the Examiner's most recent argument regarding all pending claims.

A. New Arguments

In Section II, of the Examiner's Answer, the Examiner makes a new argument that "Wood discloses that the interfaces may control the application in 'at about the same time.'" Such argument is at least procedurally inappropriate in that it is not in compliance with MPEP § 1207.03, Section I. No indication that approval by the Technology Center Director or designee has been presented to Applicants nor was such argument properly identified as such in the Examiner's Answer. Therefore, it is respectfully requested that this argument be withdrawn.

B. Claims 31-45

Claims 31-45 were rejected as being obvious in light of Wood et al (US 5,715,823). Independent Claim 31 recites, *inter alia*, "means for updating located at the first location and configured to receive a command from the second means for interfacing and transmit an interface update to the second means for interfacing in response to the command, the means for updating being configured to automatically send interface updates to refresh the second means for interfacing." In sum, Applicants' argued in their Appeals Brief that Wood failed to disclose a

suggestion or motivation to provide an update to both a first user interface and a second user interface (both at different locations than the imaging system) in response to a command from one of the first and second user interfaces. In response, in section II(C) of the Examiner's Answer, the Examiner argued,

> Wood discloses a physician may monitor the progress of the operation of the ultrasound system [column 12 <<lines 23-29>>]. Wood does not expressly disclose that updates would be automatic, but Wood's disclosure of monitoring the progress of the ultrasound system suggests the necessity of a continuous or automatic updating functionality.

The Examiner argues that the ability to "automatically send interface updates to refresh the second means for interfacing" is implicitly found in the Wood reference. However, this argument should fail as Wood et al. actually teach away from automatically updating the second means for interfacing in the manner disclosed by Applicants. Specifically, in Column 12 lines 20 through 30, Wood et al. teach,

> To the operator at the system and that interrogator at the remote terminal, their separate functions appear to each of them to be executed in real-time, without conflict with the activities of the other. This means, for instance, that a physician can monitor the progress of an ultrasonographer operating the ultrasound system, retrieving images for diagnoses and patient reports from the ultrasound system, for <u>one patient</u> while the ultrasonographer is in the process of conducting a diagnostic examination of <u>another patient</u>. (underline added for emphasis).

Wood details an apparatus for control of an imaging system having two separate interfaces used for monitoring two separate patients and/or subjects. However Applicants' system includes separate interfaces configured to monitor <u>one patient</u> continuously updating each interface at two separate locations. *See*, Paragraph [0033] lines 1-6 ("--a given imaging system can be simultaneously accessed by one or more persons located at local and/or remote locations. All the persons accessing a given imaging system at a given time may be shown <u>similar, if not identical</u>, information in real-time or quasi real-time via corresponding user interfaces, --")(underline added for emphasis). Applicants teach that the imaging system is observing the same subject – thereby relating "similar,

if not identical, information" – not the observation of two separate patients or subjects. *See generally*, Applicants' FIG. 2 and Paragraphs [0032-0037]; *See also*, Paragraph [0003] (which details at least some of the benefits therein). Wood et al. do not teach or suggest a "means for updating being configured to automatically send interface updates to refresh the second means for interfacing." Therefore the rejection of Claims 31-45 should fail.

The Examiner also argues that having the automatic updates would be obvious to a person of ordinary skill in the art. The Examiner cites, browsed sports scores on ESPN.com in support of this proposition. However, news broadcasting is outside of the scope of the prior art. Instead of providing motivation or suggestion to modify in the prior art, the Examiner relies on impermissible hindsight in his reasoning. Accordingly, the Examiner's rejection of Claims 31-45 should fail.

III. Conclusion

In view of the foregoing, Appellants submit that the claims are not properly rejected as being unpatentable under 35 U.S.C. §102(a) or under 35 U.S.C. §103(a) over the cited reference. Accordingly, it is respectfully requested that the board reverse the claim rejections and indicate that a Notice of Allowance respecting all pending claims be issued.

Respectfully submitted,

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CLAIMS APPENDIX

1. A method for remote or collaborative control of an imaging system, the imaging system associated with an application model located at a first location and the application model being in communication with the imaging system, the method comprising:

providing a first user interface at the first location;

providing a second user interface at a second location, in response to a request for remote or collaborative control of the imaging system at the second location; and

controlling the application model using the first user interface and the second user interface at about a same time.

2. The method of claim 1, wherein providing a second user interface includes generating the second user interface from the application model.

3. The method of claim 2, wherein providing a second user interface includes replicating at least a part of the first user interface using the application model to the second location.

4. The method of claim 1, further comprising commanding the imaging system using at least one of the first and the second user interfaces.

5. The method of claim 4, further comprising updating the first and the second user interfaces in response to at least one command made to the imaging system by at least one of the first and the second user interfaces or in response to at least one response returned from the imaging system.

6. The method of claim 5, wherein updating the first and the second user interfaces include the application model generating an interface update in response to the at least one command from the first or the second user interface or in response to the at least one response from the imaging system.

7. The method of claim 1, wherein the first location is proximate to the imaging system.

8. The method of claim 1, wherein the second location is remote from the first location and the imaging system.

9. The method of claim 8, wherein communicating with the application model by the second user interface includes communicating with a communications network coupled between the application model and the second user interface.

10. The method of claim 9, wherein the communications network is selected from a group including an intranet, the Internet, a local area network (LAN), a broadband network, a wireless network, and a variety of other networks.

11. The method of claim 1, wherein the second user interface is proximate to the imaging system.

12. The method of claim 1, wherein the second location is the first location.

13. The method of claim 12, wherein communicating with the application model includes the first and the second user interfaces directly communicating with the application model.

14. The method of claim 12, wherein the first user interface, the second user interface, and the application model are included in a collaboration control unit.

15. The method of claim 1, further comprising providing a third user interface at a third another location where the remote or collaborative control will occur, wherein the locations of the first, the second, and the third user interfaces are different from each other.

16. The method of claim 1, wherein the first user interface is a user interface selected from a group including a user interface similar to at least a portion of the second user interface, and a user interface different from the second user interface.

17. An apparatus for remote or collaborative control of an imaging system, the imaging system, the apparatus comprising:

a control unit including a first user interface and an application model, the control unit being in communication with the imagine system;

a second user interface provided at a second location, the second user interface usable for remote or collaborative control of the imaging system and being configured to transmit a command to the control unit and to receive a second user interface update from the control unit;

wherein the second user interface is provided in response to a request for remote or collaborative control of the imaging system at the second location; and

wherein the apparatus is configured such that the application model can be controlled using the first user interface and the second user interface at about a same time.

18. The apparatus of claim 17, wherein the second user interface is generated from the application model when remote or collaborative control of the imaging system is requested by an operator.

19. The apparatus of claim 17, wherein the second user interface is configured to transmit a command to the application model and to receive a user interface update from the application model.

20. The apparatus of claim 17, wherein the first user interface is configured to transmit a command to the application model and to receive a user interface update from the application model.

21. The apparatus of claim 20, wherein the imaging system is controlled via at least one of a first and a second command from the first and the second user interfaces, respectively.

22. The apparatus of claim 20, wherein user interface updates are generated by the application model in response to any of the command from the first user interface, the command from the second user interface, and at least one response returned from the imaging system.

23. The apparatus of claim 22, wherein user interface updates sent to the first user interface and the second user interface are similar to each other.

24. The apparatus of claim 17, wherein the second location is remote from the imaging system and the first location.

25. The apparatus of claim 24, further comprising a communications network coupled between the application model and the second user interface.

26. The apparatus of claim 25, wherein the communications network is selected from a group including an intranet, the Internet, a local area network (LAN), a broadband network, and a wireless network.

27. The apparatus of claim 17, wherein the second location is proximate to the first location.

28. The apparatus of claim 27, wherein the second user interface is included in the control unit.

29. The apparatus of claim 17, further comprising

a third user interface at a third location where the remote or collaborative control will occur,

wherein the locations of the first, the second, and the third user interfaces are different from each other; and

wherein the apparatus is configured such that the application model can be controlled using the first user interface, the second user interface, and the third user interface at about a same time.

30. The apparatus of claim 17, wherein the second user interface is included in at least one of a local operator console and a remote workstation.

31. An apparatus for remote or collaborative control of an imaging system, the apparatus comprising:

first means for interfacing at a first location;

second means for interfacing at a second location, in response to a request for remote or collaborative control of the imaging system at the second location; and

means for updating located at the first location and configured to receive a command from the second means for interfacing and transmit an interface update to the second means for interfacing in response to the command, the means for updating being configured to automatically send interface updates to refresh the second means for interfacing.

32. The apparatus of claim 31, wherein the means for updating is further configured to receive a command from the first means for interfacing and transmit an interface update to the first means for interfacing in response to the command from the first means for interfacing.

33. The apparatus of claim 32, wherein

the interface update transmitted in response to the command from the first means for interfacing is transmitted to the first and second means for interfacing in response to the command from the first means for interfacing, and

the interface update transmitted in response to the command from the second means for interfacing is transmitted to the first and second means for interfacing in response to the command from the second means for interfacing.

34. The apparatus of claim 31, wherein the second means for interfacing is generated from the means for updating in response to the request for remote or collaborative control from an operator located at the second location.

35. The apparatus of claim 31, wherein the second location is remote from the first location.

36. The apparatus of claim 35, further comprising means for communicating configured to provide communication between the means for updating and the second means for interfacing.

37. The apparatus of claim 36, wherein the means for communicating is selected from a group including an intranet, the Internet, a local area network (LAN), a broadband network, and a wireless network.

38. The apparatus of claim 31, wherein the means for updating and the first means for interfacing are located proximate to the imaging system.

39. The apparatus of claim 31, wherein the second location is the first location.

40. The apparatus of claim 39, wherein the means for updating, the first means for interfacing, and the second means for interfacing are included in a collaboration control.

41. The apparatus of claim 31, further comprising third means for interfacing at ~~an~~ another location where remote or collaborative control of the imaging system is requested, wherein the first, the second, and the third means for interfacing are provided at different locations.

42. The apparatus of claim 41, wherein the third means for interfacing is generated from the means for updating in response to a request for remote or collaborative control from an operator located at the another location.

43. The apparatus of claim 41, wherein the means for updating is further configured to receive a command from the third means for interfacing and transmit an interface update to the third means for interfacing in response to the third command.

44. The apparatus of claim 43, wherein the apparatus is configured such that

an interface update is transmitted to the first, second, and third means for interfacing in response to a command from the first means for interfacing,

the interface update transmitted in response to the command from the first means for interfacing is transmitted to the first, second, and third means for interfacing in response to the command from the second means for interfacing, and

the interface update transmitted in response to the command from the first means for interfacing is transmitted to the first, second, and third means for interfacing in response to the command from the third means for interfacing.

45. The apparatus of claim 31, wherein the imaging system is selected from a group including a magnetic resonance (MR) imaging system, a computerized tomography (CT) imaging system, a nuclear medicine (NM) imaging system, and a x-ray system.

46. An image generated by the steps comprising:

providing a first user interface at a first location and a second user interface at a second location;

commanding an imaging system located at a third location with a command from at least one of the first user interface and the second user interface;

generating an interface update in response to the command to the imaging system, the interface update including data representative of the image; and

providing the interface update to the first user interface and the second user interface,

wherein the second user interface is provided at the second location when a remote or collaborative control of the imaging system is requested by a user at the second location.

47. The image of claim 46, wherein the first location and the second location are remote from each other.

48. The image of claim 47, wherein the third location is the same as the first location or the second location.

49. The image of claim 47, wherein the first, the second, and the third locations are remote from each other.

50. The image of claim 46, wherein the first location and the second location are proximate to each other.

51. The image of claim 50, wherein the third location is the same as the first location or the second location.

52. The image of claim 50, wherein the third location is remote from at least one of the first location and the second location.

53. The image of claim 46, wherein the providing step includes providing the second user interface using an application model in communication with the imaging system.

54. The image of claim 46, further comprising communicating to and from the first and the second user interfaces via an application model in communication with the imaging system.

55. The image of claim 54, wherein the generating step includes generating the interface update using the application model.

56. The image of claim 55, further comprising updating the first and the second user interfaces in response to the interface update.

57. The image of claim 56, wherein the updating step includes displaying the image on a means for displaying associated with each of the first and the second user interfaces.

58. The image of claim 46, wherein the command is selected from a group including image contrast prescription commands, scanning session commands, image acquisition plane prescription commands, archiving commands, pulse sequence prescription commands, image retrieval commands, imaging system configuration commands, and a variety of other commands.

59. The apparatus of claim 17, wherein the system is configured such that if a change is made to the application model using the first user interface data is automatically sent to the second user interface to update the second user interface, and such that if a change is made to the application model using the second user interface data is automatically sent to the first user interface to update the first user interface.

60. The apparatus of claim 17, wherein the application model is run on a processor separate from the imaging device.

61. The apparatus of claim 17, wherein the first user interface and second user interface are updated in real-time based on data from the application model.

62. The apparatus of claim 17, wherein the first user interface and the second user interface are configured to be controlled by a user in a same manner.

63. The apparatus of claim 17, wherein the first user interface and the second user interface are configured to display information relating to the application model in a same format.

64. The apparatus of claim 17, wherein the first user interface and second user interface are configured to be continuously updated in substantially real time.

65. The apparatus of claim 17, further comprising a third user interface configured to collaboratively control the application model with the first user interface and the second user interface.

66. A system for remote or collaborative control of an imaging system, comprising:

an application model configured to be in communication with an imaging device;

a first user interface configured to control the application model; and

a second user interface configured to control the application model;

wherein the application model is configured such that it may be collaboratively controlled by the first user interface and the second user interface.

67. The system of claim 66, wherein the system is configured such that if a change is made to the application model using the first user interface data is automatically sent to the second user interface to update the second user interface, and such that if a change is made to the application model using the second user interface data is automatically sent to the first user interface to update the first user interface.

68. The system of claim 66, wherein the application model is run on a processor separate from the imaging device.

69. The system of claim 66, wherein the first user interface and the second user interface are located remote from the application model.

70. The system of claim 66, wherein the first user interface and second user interface are updated in real-time based on data from the application model.

71. The system of claim 66, wherein the first user interface and the second user interface are configured to be controlled by a user in a same manner.

72. The system of claim 66, wherein the first user interface and the second user interface are configured to display information relating to the application model in a same format.

73. The system of claim 66, wherein the first user interface is configured to be generated in response to a request for control of the imaging system at a first location, and the second user interface is configured to be generated in response to a request for control of the imaging system at a second location.

74. The system of claim 66, wherein the first user interface and second user interface are configured to be continuously updated in substantially real time.

75. The system of claim 66, further comprising a third user interface configured to collaboratively control the application model with the first user interface and the second user interface.

76. The system of claim 66, wherein the application model is run on a processor that is part of the imaging device.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.